

EXAMPLE 1: Transaxle for Remote Control Car

This example illustrates how inventorship is determined for claims related to Artificial Intelligence (AI)-assisted inventions in accordance with the Inventorship Guidance for AI-assisted Inventions (Inventorship Guidance).¹ The claims and scenarios are hypothetical. Readers should presume that all claims are properly supported under 35 U.S.C. 112 by the specification as filed.

Scenario 1 discusses the ideas present in guiding principles 2 and 3 of the AI inventorship guidance. In this scenario, natural persons provide a basic query to the AI system and do not alter the output in any manner.

Scenario 2 discusses the ideas present in guiding principle 3 of the Inventorship Guidance. In this scenario, natural persons provide minimal alterations to the output of the AI system.

Scenario 3 discusses the ideas present in guiding principles 1 and 3 of the Inventorship Guidance. In this scenario, natural persons perform experiments on AI output and create a modified design.

Scenario 4 discusses the ideas present in guiding principle 1 of the AI inventorship guidance. In this scenario, natural persons use an AI system to suggest minor alterations to an invention.

Scenario 5 discusses the ideas present in guiding principle 5 of the AI inventorship guidance. This scenario discusses the creator and owner of an AI system, who does not otherwise participate in the inventive process.

Background

The XYZ Toy Company has recently expanded its business into remote control (RC) cars. Ruth and Morgan, engineers at the XYZ Toy Company, have been tasked with developing the new RC cars. In designing the cars, Ruth and Morgan recognize the RC car will need a transaxle. Since the company is new to developing transaxles, they recognize that creating one from scratch will be time consuming and costly. Ruth and Morgan decide to use an AI system to create a preliminary design to begin manufacturing in time for the holiday rush. They have recently read several news articles about a free publicly available generative AI system called Puerto5 that receives natural language prompts as input and generates text, images, and other media as output.

¹ See Guidance: Inventorship Guidance on AI-Assisted Inventions, available at <https://www.federalregister.gov/public-inspection/2024-02623/guidance-inventorship-guidance-on-ai-assisted-inventions>.

Ruth and Morgan provide a general prompt to Puerto5 to elicit a preliminary design for the transaxle. The prompt states: “Create an original design for a transaxle for a model car, including a schematic and description of the transaxle.”

The output from Puerto5 includes a preliminary design for a transaxle that is comprised of a casing, a transmission that is removably mounted within the casing and secured by fasteners, and axle shafts that extend from the casing. The casing of the preliminary design consists of two elements that are separable along a vertical plane. Ruth and Morgan review the output and agree that the design should work in their RC car.

Scenario 1

Additional facts for scenario 1:

Company XYZ prepares a patent application, with the assistance of Ruth and Morgan. The application includes claim 1 to the transaxle output by Puerto5.

Claim

[Claim 1] A transaxle comprising:

a casing;

a transmission;

said transmission separate from said casing and removably mounted within said casing;

axle shafts extending from said casing;

said casing being defined by two separable casing elements of said transaxle; and

a fastener on said transmission that removably mounts the transmission to one of said separable casing elements.

Ruth and Morgan are not proper inventors of the invention of claim 1.

Analysis:

To be named as an inventor in a patent application, a natural person must make a significant contribution to the invention. Under the *Pannu* factors, a person makes a significant contribution to an invention if they: (1) contributed in some significant manner to the conception of the invention; (2) made a contribution to the claimed invention that is not insignificant in quality, when that contribution is measured against

the dimension of the full invention; and (3) did more than merely explain the well-known concepts and/or the current state of the art.²

Under the first *Pannu* factor, Ruth and Morgan participated in the invention process by recognizing that there was a need for a transaxle in RC cars, prompting the AI system to solve the problem, and reviewing the AI system output. Morgan and Ruth recognizing that RC cars need a transaxle demonstrates their recognition of a problem. However, recognition of a problem or having a general goal alone does not rise to the level of conception.³ Ruth and Morgan additionally constructed the prompt for the AI. They recognized a need for the

Guiding principle 2: Merely recognizing a problem or having a general goal or research plan to pursue does not rise to the level of conception. A natural person who only presents a problem to an AI system may not be a proper inventor or joint inventor of an invention identified from the output of the AI system. However, a significant contribution could be shown by the way the person constructs the prompt in view of a specific problem to elicit a particular solution from the AI system. *See Inventorship Guidance*, section IV.B, principle 2.

RC car to have a transaxle, and their prompt is simply a restatement of that general problem. Specifically, Ruth and Morgan are not attempting to solve any particular problem with transaxles or RC cars more broadly. They did not make any inventive contribution with the way the prompt was constructed in order to obtain a particular solution from the AI system. Lastly, Ruth and Morgan reviewed the output of Puerto5 and agreed the design should work for the RC car. However, recognition and appreciation of the invention without any significant contribution to the conception of the claimed invention is not sufficient for inventorship. Therefore, their contribution amounts to recognizing a problem and asking an AI system to solve that problem. For these reasons, Ruth and Morgan’s contribution was not a significant contribution to the conception of the invention.⁴

Since Ruth and Morgan did not make any other contribution to the invention creation process, neither provided a significant contribution to the conception of the invention. As the courts have found that a failure to meet any one of the *Pannu* factors precludes that person from being named an inventor, Ruth and Morgan are not proper inventors of the subject matter of claim 1.⁵

² *Pannu v. Iolab Corp.*, 155 F.3d 1344, 1351 (Fed. Cir. 1998). As discussed in the *Inventorship Guidance*, *Pannu*’s reference to reduction to practice as part of its first factor is an acknowledgement that simultaneous conception and reduction to practice may be applicable in certain unpredictable technologies. Since this doctrine is generally not applicable in the context of example 1, “reduction to practice” is omitted from factor 1 throughout this example. See generally *Eli Lilly v. Aradigm Corp.*, 376 F.3d 1352, 1359 (Fed. Cir. 2004) (“a person is a joint inventor only if [they] contribute[] to the conception of the claimed invention”); *Solvay S.A. v. Honeywell Intern. Inc.*, 622 F.3d 1367, 1377-78 (Fed. Cir. 2010) (reducing an invention to practice that was conceived by another is not sufficient for conception).

³ See *Inventorship Guidance*, section IV.B, principle 2.

⁴ *Id.*

⁵ For exemplary purposes, only the first *Pannu* factor has been analyzed in this example. This analysis should not be construed as stating the contributions of Ruth and Morgan would meet the requirements of the second or third *Pannu* factors.

Scenario 2

Additional facts for scenario 2:

Morgan, using the schematic created by Puerto5, builds the transaxle of claim 1. Morgan follows the schematic exactly and does not alter the design. Steel is a common material used in the RC car industry to build transaxles. The company has a large supply of steel available, and Morgan chooses it to construct the casing element.

Claim 2 of the application reads:

[Claim 2] The transaxle of claim 1, wherein the casing is constructed from steel.

Morgan is not a proper inventor of claim 2.

Analysis:

To be named as an inventor in a patent application, a natural person must make a significant contribution to the invention. Under the *Pannu* factors, a person makes a significant contribution to an invention if they: (1) contributed in some significant manner to the conception of the invention; (2) made a contribution to the claimed invention that is not insignificant in quality, when that contribution is measured against the dimension of the full invention; and (3) did more than merely explain the well-known concepts and/or the current state of the art.

Since claim 2 is dependent on claim 1, it incorporates by reference all the limitations from claim 1. Therefore, the analysis of claim 2 must evaluate all the limitations set forth in both claims 1 and 2. For the same reasons set forth in scenario 1, Ruth and Morgan's contributions to identifying a problem and prompting Puerto5 to solve that problem are not significant.

With respect to the first *Pannu* factor, Morgan has built the transaxle using a schematic provided by Puerto5 and has contributed to the invention by selecting a building material for the casing. With respect to building the transaxle, that a

Guiding principle 3: (excerpt) Reducing an invention to practice alone is not a significant contribution that rises to the level of inventorship. *See Inventorship Guidance*, section IV.B, principle 3.

human performs a significant contribution to the reduction to practice of an invention conceived by another is not enough to constitute inventorship.⁶ Morgan simply built the transaxle according to the schematic created by Puerto5 without modification. Therefore, Morgan's construction of the transaxle did not provide any contribution to the conception of the invention. Morgan's mere reduction to practice of the invention is not sufficient to

⁶ *See Inventorship Guidance*, section IV.A and section IV.B, principle 3.

establish inventorship of claim 2, and the deficiencies addressed in scenario 1 above still apply.

As per the choice to use steel to build the casing, this is not a significant contribution to the conception of the invention under the first *Pannu* factor. To reduce the design to practice, it was necessary for Morgan to select some building material. The selection of a common material used in the RC car industry to build transaxles was merely the exercise of ordinary skill in the art and is not a significant contribution.⁷ This point is further illustrated by evaluating the contribution under the second *Pannu* factor. As explained in scenario 1, the preliminary design, which is described in the independent claim, was generated in its entirety by Puerto5. Morgan's only contribution to the invention is the use of steel to construct the casing. Given the full scope of claim 2 to a transaxle, which includes a casing, a transmission, axle shafts, and fasteners as well as the way in which these parts are integrated together, the material of the casing is minimal in comparison to the full scope of the invention of claim 2. The material of the casing does not provide any substantial benefit to the invention as a whole, and it does not address any particular problem of the preliminary design. Accordingly, Morgan's contribution is insignificant in quality when measured against the full scope of the invention.

The courts have found that a failure to meet any one of the *Pannu* factors precludes that person from being named an inventor. For these reasons and those set forth in scenario 1 above, Ruth and Morgan are not proper inventors of the subject matter of claim 2.

Scenario 3

Additional facts for scenario 3:

Following the initial output of the preliminary design by Puerto5, Ruth and Morgan further prompt Puerto5 to provide alternative transaxle designs. Puerto5 outputs an alternative transaxle design in which casing elements could be separable along a horizontal plane. Ruth and Morgan decide to build this design having a horizontal separation. They discover that creating an operable transaxle with a horizontal separation in the casing requires additional modifications and significant experimentation. They conduct those experiments and determine that the casing needs to be elongated, with a horizontal separation located in the upper third of the casing. In addition, Ruth and Morgan find that the axle shafts and transmission need to be located in the lower two thirds of the casing. Morgan further determines that conventional fasteners are cumbersome and designs a clip fastener for removably attaching the transmission to the casing.

Claim 3 of the application recites:

[Claim 3] A transaxle comprising:

⁷ See, e.g., *Caterpillar Inc. v. Sturman Indus.*, 387 F.3d 1358, 1376 (Fed. Cir. 2004).

an elongated casing;

a transmission;

said transmission being separate from said casing and removably mounted within the lower two thirds of said casing;

axle shafts extending from the lower two thirds of said casing;

said casing being defined by two separable casing elements wherein the separation of said casing elements is along a horizontal plane that is parallel to the axle shafts;

wherein said casing elements are separable at a location within the upper third of said casing; and

a clip fastener on said transmission that removably mounts the transmission to one of said separable casing elements.

Ruth and Morgan are proper inventors of the invention of claim 3.

Analysis:

To be named as an inventor in a patent application, a natural person must make a significant contribution to the invention. Under the *Pannu* factors, a person makes a significant contribution to an invention if they: (1) contributed in some significant manner to the conception of the invention; (2) made a contribution to the claimed invention that is not insignificant in quality, when that contribution is measured against the dimension of the full invention; and (3) did more than merely explain the well-known concepts and/or the current state of the art.

With respect to the first *Pannu* factor, Ruth and Morgan contributed significantly to the conception of the invention. Ruth and Morgan made significant alterations to the alternative design as a direct result of their experimentation. Specifically, they created a new design in which the casing is elongated, the horizontal separation is in the upper third of the casing, and the axle shafts are located in the lower two thirds. Additionally, Morgan contributed further to the invention by designing the clip fastener for removably attaching the transmission to the casing. These contributions were not the result of simply reducing the alternative design to practice but were significant contributions to the conception of

Guiding principle 1: A natural person's use of an AI system in creating an AI-assisted invention does not negate the person's contributions as an inventor. The natural person can be listed as the inventor or joint inventor if the natural person contributes significantly to the AI-assisted invention. *See Inventorship Guidance*, section IV.B, principle 1.

Additionally, Morgan contributed further to the invention by designing the clip fastener for removably attaching the transmission to the casing. These contributions were not the result of simply reducing the alternative design to practice but were significant contributions to the conception of

the invention. A person who takes the output of an AI system and makes a significant contribution to the output to create an invention may be a proper inventor.⁸ Additionally, a natural person's use of an AI system in creating an AI-assisted invention does not negate the person's contributions as an inventor.⁹

With respect to the second *Pannu* factor, Ruth and Morgan's experimentation on the general idea of a casing having a horizontal separation resulted in substantial alteration of the preliminary design, including the specific arrangement of the casing elements and the clip fastener. These elements are integral to the invention of claim 3. Accordingly, Ruth and Morgan's contributions are not insignificant in quality when measured against the dimension of the full invention, as defined in claim 3.

With respect to the third *Pannu* factor, Ruth and Morgan's contributions to the inventive process were not the result of explaining the current state of the art or well-known concepts. To the contrary, their contributions amounted to a new design.

Since Ruth and Morgan both made significant contributions to the invention, Ruth and Morgan are the proper inventors of the subject matter of claim 3.

Scenario 4

Additional facts for scenario 4:

After completing the models of scenario 3, Morgan prompts Puerto5 with details of their newly created design and a general request that Puerto5 provide manufacturing suggestions. Puerto5 outputs a suggestion that the casing could be milled out of aluminum using a Computer Numerical Control (CNC) routing machine. Morgan recognizes that a CNC routing machine is a conventional fabrication tool and that the transaxle casing could be readily constructed according to Puerto5's suggestion.

The application includes claim 4:

[Claim 4] The transaxle of claim 3, wherein the casing is made out of aluminum.

Morgan and Ruth are proper inventors of the invention of claim 4.

Analysis:

To be named as an inventor in a patent application, a natural person must make a significant contribution to the invention. Under the *Pannu* factors, a person makes a significant contribution to an invention if they: (1) contributed in some significant manner to the conception of the invention; (2) made a contribution to the claimed

⁸ See Inventorship Guidance, section IV.B, principle 3.

⁹ *Id.* at section IV.B, principle 1.

invention that is not insignificant in quality, when that contribution is measured against the dimension of the full invention; and (3) did more than merely explain the well-known concepts and/or the current state of the art.

With respect to the first *Pannu* factor and as discussed in more detail in scenario 3, Ruth and Morgan made a significant contribution to the conception of the invention. They made alterations to the alternative design output by Puerto5 to arrive at a completely new design. The AI system's suggestion to use aluminum does not change that inventorship determination.

With respect to the second *Pannu* factor, Ruth and Morgan's contribution is significant when measured against the full scope of claim 4. Since claim 4 is dependent on claim 3, it incorporates by reference all the limitations from claim 3. Therefore, the analysis of claim 4 must evaluate all the limitations set forth in both claims 3 and 4.

As described in scenario 3, Ruth and Morgan contributed to many of the elements of claim 3 by creating their new design. Claim 4 provides the additional limitation that the casing is made out of aluminum. Despite this additional limitation being suggested by Puerto5, Ruth and Morgan's contribution is not insignificant given the full scope of the claim. Their contribution is still integral to the claimed invention. The additional feature is conventional and achievable with routine experimentation. This limitation is not so substantial that it would overshadow the other claim limitations contributed by Ruth and Morgan. A natural person's use of an AI system in creating an AI-assisted invention does not negate the person's contributions as an inventor.¹⁰ The additional element of aluminum as a casing material does not negate the significance of Ruth and Morgan's contributions to the invention as a whole.

Guiding principle 1: A natural person's use of an AI system in creating an AI-assisted invention does not negate the person's contributions as an inventor. See *Inventorship Guidance*, section IV.B, principle 1.

is conventional and achievable with routine experimentation. This limitation is not so substantial that it would overshadow the other claim limitations contributed by Ruth and Morgan. A natural person's use of an AI system in creating an AI-assisted invention does not negate the person's

Finally, with respect to the third *Pannu* factor, as explained in scenario 3, Ruth and Morgan's contributions to the inventive process were not the result of explaining the current state of the art or well-known concepts.

Since Ruth and Morgan both made significant contributions to the invention, Ruth and Morgan are the proper inventors of the subject matter of claim 4.

Scenario 5

Additional facts for scenario 5:

Maverick is the lead AI engineer who oversaw the creation and training of Puerto5. Puerto5 was trained on diverse collections of documents from various fields, via standard

¹⁰ *Id.* at section IV.B, principle 1.

self-supervised learning techniques. When Maverick designed and trained Puerto5, he was unaware of any specific problems related to transaxles in RC cars.

Maverick is not a proper inventor of the subject matter of claims 1-4.

Analysis:

To be named as an inventor in a patent application, a natural person must make a significant contribution to the invention. Under the *Pannu* factors, a person makes a significant contribution to an invention if they: (1) contributed in some significant manner to the conception of the invention; (2) made a contribution to the claimed invention that is not insignificant in quality, when that contribution is measured against the dimension of the full invention; and (3) did more than merely explain the well-known concepts and/or the current state of the art.

With respect to the first *Pannu* factor, Maverick's contribution is limited to the creation and training of Puerto5, using standard learning techniques and generalized knowledge. However, this is not a significant contribution to the conception of the invention. Maintaining "intellectual domination" over an AI system does not, on its own, make a person an inventor of any inventions created through the use of the AI system.¹¹ In some situations, the natural person(s) who designs, builds, or trains an AI system in view of a specific problem to elicit a particular solution could be an inventor, where the designing, building, or training of the AI system is a significant contribution to the invention created with the AI system.¹²

However, Puerto5 was developed to solve general knowledge problems. It was not designed with any particular problem in mind or to elicit any particular solution to a problem. Maverick is only the person who created and maintains Puerto5, which was used in the creation of the transaxle, and Maverick provided no significant contribution to the conception of the claimed transaxle. For at least these reasons, Maverick did not significantly contribute to any of the inventions in claims 1-4. As the courts have found that a failure to meet any one of the *Pannu* factors precludes that person from being named an inventor, Maverick is not a proper inventor of the claimed inventions.

Guiding principle 5: Maintaining "intellectual domination" over an AI system does not, on its own, make a person an inventor of any inventions created through the use of the AI system. Therefore, a person simply owning or overseeing an AI system that is used in the creation of an invention, without providing a significant contribution to the conception of the invention, does not make that person an inventor. *See Inventorship Guidance*, section IV.B, principle 5.

¹¹ *Id.* at section IV.B, principle 5; *In re Verhoef*, 888 F.3d 1362, 1367 (Fed. Cir. 2018).

¹² *See Inventorship Guidance*, section IV.B, principle 4.